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frangibility produce greater decoloring effect than those of high refrangibility, but from the results obtained here it would seem that decoloration is in no way directly or inversely proportioned to refrangibility. It will be seen that the blue and the red are close together here, while in the solar spectrum they are far apart.

In the accompanying Fig. 2, *I* is given the curve of decoloration of an alcoholic solution of chlorophyll with the screens already described. The vertical lines represent *relative* quantity of effect—*d*, darkness; *r*, red; *y*, yellow; *g*, green; *v*, violet; *w*, weak diffused light. In Fig. 2, *II* is given the curve for relative phototropism. In both cases no attempt is made to represent the actual difference between any two as compared with any other two, *e. g.*, in Fig. 2, *II*, *blue* is three units above *green* simply because it happens to be stronger (in effect) than *diffused light*, which is stronger than *violet*, which is stronger than *green*; nor is it intended that the 'colors' indicated shall be in the exact position of the spectrum, though so far as the 'colors' are concerned they are in that order.

In nearly all the experiments the apparatus was indoors, and the light exposure chiefly north. Some light came from the east and about an equal amount of exposure toward the west. The first experiments were made in the greenhouse, but it was found that too much heat was produced, resulting in the wilting and even in the death of the plants. However, so far as carried on, the results were identical with those under diffused light.

The plants which proved most susceptible to phototropic influences were barley, wheat and tobacco seedlings. The best, most positive and the quickest results were obtained with wheat and with barley seedlings from five to forty mm. high. Other seedlings used were *Catalpa*, *Datura*, bean, pea, corn, sunflower and pumpkin.

No attempt is here made to deduce a physiological or a physical law from these phenomena because it is thought that sufficient data are not yet at hand; nor is there any quantitative effect estimated as existing between any two of the screens used. It is quite

clear, however, that the statements of Sachs and others, namely, that the effect, whether phototropic or bleaching of chlorophyll solution, varies as the refrangibility, is not correct. It may be, however, that had the formulæ of their screens been given, it might be possible to see how they arrived at their results.

On looking at the spectra of the screens here given it may be seen that the blue permits considerable of other 'colors' to pass through, especially red. Now, since the phototropic effect of blue is greater than that of diffused daylight, the conclusion naturally follows that some portion of the solar spectrum is negatively phototropic because the blue as well as the other 'colors' passes through window glass. The question at once is suggested then as to where in the spectrum this negative portion is; but seeing that all the 'colors' here given are positively phototropic, the one conclusion is left, and that is but a mere suggestion, namely, that it may occur in those darker bands in the blue represented by the sharp down curve in its spectrum.

It is the intention of the writer to investigate this point by securing screens as nearly as possible corresponding to those portions of the spectrum; and at the same time to examine other intervening 'colors.'

J. B. DANDENO.

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SCIENTIFIC NOTES AND NEWS.

At the last meeting of the Rumford Committee of the American Academy of Arts and Sciences, the sum of three hundred dollars was granted to Professor W. J. Humphreys, of the University of Virginia, in aid of his research on the shift of spectrum lines due to pressure; and the sum of two hundred and fifty dollars to Professor N. A. Kent, of Wabash College, in aid of his research on the circuit conditions influencing electric spark lines.

DR. CARLOS J. FINDLAY, of Havana, well known for his work on yellow fever, has been elected president of the American Public Health Association. The next meeting of the association will be held in Havana in April.

THE council of the Royal Meteorological Society has awarded the Symons gold medal to Hofrath Dr. Julius Hann, of Vienna, in recognition of the valuable work which he has done in connection with meteorological science. The medal, which is awarded biennially, was founded in memory of Mr. G. J. Symons, F.R.S., the originator of the British Rainfall Organization. It will be presented to Dr. Hann at the annual meeting of the society on January 20.

PROFESSOR FLINDERS PETRIE, F.R.S., has been appointed a delegate from the University of London to the International Congress of Archeology to be held at Athens in April, 1905.

The Botanical Gazette states that Dr. O. Melville Ball, of Batesville, Va., has been elected a member of the German Botanical Society.

DR. H. N. STOKES, of the U. S. Geological Survey, has been appointed chemist in the National Bureau of Standards. His temporary and mail address is Bureau of Chemistry, Department of Agriculture, Washington, D. C.

MR. W. J. PALMER, a graduate of the Ontario Agricultural College, has been appointed director of agriculture in the Orange River Colony at a salary of \$6,000 per annum.

PRESIDENT H. S. PRITCHETT, of the Massachusetts Institute of Technology, has, according to the daily papers, tested the high speed electrical railway at Zossen, and has examined the Hamburg closed harbor. He will sail from Cherbourg for New York on November 11.

DR. ALBERT D. MEAD, professor of comparative anatomy in Brown University, has returned from a three months' trip through England, Holland, Germany, Italy and France, during which a thorough inspection was made of all the important biological laboratories and experiment stations.

MR. W. T. SWINGLE has returned to Washington after a study of the plants in the regions about the Mediterranean.

PROFESSOR FILIBERT ROTH, who holds the chair of forestry in the University of Mich-

igan, has been elected forest warden of the state.

The American Geologist notes appointments as follows: Professor E. C. Perisho, of the State Normal School of Platteville, Wis., has been appointed state geologist of South Dakota and professor of geology in the State University. Dr. A. G. Leonard, assistant state geologist of Iowa, has been appointed professor of geology in the University of North Dakota, and Dr. A. F. Wilder, lately state geologist of North Dakota, has accepted the professorship of geology in the State University of Iowa.

H. CHESTER CROUCH, professor of mechanical engineering at the University of Colorado, died on October 29, in Boulder, of typhoid fever at the age of thirty-two.

THE death is announced of Dr. Wilhelm Rimpau, of Schlanstadt, Germany, known for his work on plant breeding.

THE winter meeting of the American Chemical Society will be held at St. Louis, Mo., on December 28 and 29, in connection with the meeting of the American Association for the Advancement of Science.

THE Association of the American Agricultural Colleges and Experiment Stations will meet at Washington on November 17, 18, 19 and 20. The Association of Official Agricultural Chemists will meet at the same place on November 19 to 21.

A CONFERENCE on secondary education was held last week at Northwestern University.

THE second International Congress of Comparative Religions will be held at Basle next year.

THROUGH the gift of Dr. Thomas Biddle, the Philadelphia Academy of Natural Sciences has acquired in Berlin a valuable collection of anthropoid apes.

THE British committee appointed to consider the alleged physical deterioration of the people has held its first meeting under the chairmanship of Mr. Almeric W. FitzRoy.

The Botanical Gazette states that Mr. Barbour Lathrop, of Chicago, who has made several expeditions at his own expense to different

parts of the world, in search of valuable seeds and plants for introduction into America, has returned. He has employed on his various expeditions Mr. D. G. Fairchild, who now resumes his connection with the U. S. Department of Agriculture as one of its explorers. The countries visited this year with a view to more thorough exploration later by the department are Italy, Sicily, Tripoli, Tunis, Malta, Egypt, German East Africa, Zanzibar, Portuguese East Africa, Natal, Transvaal, Cape Colony, Grand Canary, Madeira, Portugal, Spain, Bohemia, Sweden, Denmark, Holland, Belgium and England. Such seeds and plants as were secured were given by Mr. Lathrop to the Department of Agriculture for propagation and distribution, and it is hoped that some of them may prove of great value to the country, repaying him for his patriotic and generous interest in increasing the variety of food and ornamental plants of America.

UNIVERSITY AND EDUCATIONAL NEWS.

AT Cambridge University 866 new students have been admitted, an increase of sixteen over last year. At the University of London the number is 1,016, an increase of 400 over last year.

THE London *Times* states that in connection with the Liverpool Institute of Comparative Pathology (Liverpool University), of which Professors Boyce and Sherrington are directors, a tropical veterinary department has been established. Its objects are to train veterinary and medical men in the tropical diseases of animals, to afford facilities for research in such diseases and organize expeditions, and to organize preventive measures in the tropics against diseases of animals. A memorandum on the subject has just been issued by the institute. It is pointed out that the advantages which Liverpool possesses for the study of tropical medicine are equally applicable to tropical veterinary medicine, there being an immense foreign cattle trade with the port. The Johnston Laboratory of Liverpool University, opened last May by Mr. Walter Long, M.P., contains the fully-

equipped laboratories of the Institute of Comparative Pathology, of the Tropical School of Bio-Chemistry and of the Cancer Research Committee, and is directly connected with the departments of bacteriology, pathology and physiology. These subjects, closely associated in the new Thompson Yates and Johnston Laboratories, it is pointed out, mutually help one another, and thus increase the thoroughness of training and greatly promote the opportunities for research. The secretary of state for war has approved of the course laid down by the institute, and in future officers of the Army Veterinary Department will be sent to Liverpool for their special training, the Army Department paying the fees. The Liverpool School of Tropical Medicine also trains officers sent specially by the government. In connection with the new department it is desired to establish a practical post-graduate class in veterinary medicine and also a school of veterinary medicine. Firms interested in the cattle trade have subscribed a considerable sum towards the expenses involved, but further funds are needed.

LORD GOSCHEN has been elected chancellor of Oxford University in succession to the late Lord Salisbury. Lord Strathcona, Canadian High Commissioner, has accepted the nomination to the chancellorship of Aberdeen University.

MR. HENRY SANGER SNOW has resigned the presidency of the Brooklyn Polytechnic Institute.

AT Williams College, Mr. Lorande Loss Woodruff, A.B. (Columbia, 1901), A.M., 1902, has been appointed assistant in biology.

ARTHUR E. WADE, Cornell College, 1901, has been promoted to the head of the Chemical Department of the Medical College of Sioux City, Iowa.

H. J. TURNER, Ph.D. (Johns Hopkins), has been appointed instructor in chemistry at Tufts College.

DR. E. GRIMMICH, professor of anatomy, has been elected rector of the German University of Prague.

DR. W. WIRTINGER, of Innsbrück, has been called to a chair of mathematics at Vienna.